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ABSTRACT

High demand for admission to Licensed Practical Nursing (LPN) programs and limited state resource allocations for LPN training programs in Washington, have forced North Seattle Community College (NSCC) to utilize a selective admissions policy for its LPN program. Currently, prospective LPN students are required to obtain satisfactory scores on each sub-test of the Pre-Admission and Classification Examination (PACE). Because this test costs each student $6.00 and because scores are not available for four weeks, an alternative test has been sought. Since October 1973, NSCC has been administering both the PACE and the Differential Aptitude Test (DAT) to prospective students. The DAT is free and scores are available the same day. This study compares the DAT and the PACE as predictors of success in LPN classes and on the state licensure examination. Results indicate that the DAT is a less reliable predictor of success; however, final conclusions cannot be drawn because of the limited sample size to date. The authors recommend that concerned community colleges give both tests to applicants, admit students in the top 60 percent on one or both tests, and then analyze licensure test scores through time until one test emerges superior. Tables of data are included. (DC)

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IS YOUR LPN PROGRAM KEEPING P.A.C.E.?

BY

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JC 750 374

INTRODUCTION

All public community colleges in the State of Washington have an open-door entrance policy. Due to the demand for Licensed Practical Nurses (LPN) in hospitals, nursing homes and doctors' offices, a segment of the population is interested in becoming LPN's. In the past year (1973-1974), 263 persons applied for the 72 student openings at North Seattle Community College, NSCC. Due to the limited state resource allocations, a maximum of 24 students are enrolled in the NSCC-LPN program quarterly. New students are not started in the summer, again primarily due to resource limitations.

Upon recommendation of the Washington State Board of Examiners of Licensed Practical Nurses, prospective LPN students are required to obtain satisfactory scores (40th percentile) on each of various sub-tests of the Pre-Admission and Classification Examination (PACE) to enter the NSCC-LPN program. Those satisfactorily passing the PACE are placed on an approved list until there is an opening at NSCC. A satisfactory score does not guarantee entrance into the program, as personal interviews, recommendations, etc. are also required. Those students obtaining a score below the satisfactory level are encouraged to take college exploratory courses (remedial) in mathematics, grammar, and/or study habits, and then take the PACE again. Students with low PACE scores can enter the college but not enroll in the LPN program.

Many studies have been made demonstrating the relationship of high school grades to achievement in college, among these studies are those of Juola (4), Khan (5), Lavin (6), Holtzman and Brown (3), and Scannell (7). This criterion is not fully applicable to the NSCC-LPN program. The educational background requirements for entrance into the LPN program is only a tenth-grade education or GED equivalent. Furthermore, many students graduated from high school 10-40 years ago, raised a family and now are seeking a vocation with which to supplement the family income. Therefore, high school grades are probably a minor predictor of achievement in the LPN program.

Since October 1973, the NSCC Testing Office has been administering the PACE and the Differential Aptitude Test (DAT) to perspective LPN students. The PACE costs the students six dollars ($6) and approximately a four-week wait for results; while the DAT is free, and test results are obtainable usually the same day.

Although Washington community colleges espouse the open door policy, which admits all students regardless of their readiness for further education, there is the expectation that graduates of LPN programs will succeed in passing the state licensure examination. As a consequence, screening of applicants is important to the continuance of the program.

THE PROBLEM

How can an open door institution of higher education screen applicants and maintain an open door stance, particularly if the scores on the examination are not available for four weeks, and the cost of taking the exam might exclude economically disadvantaged persons?

The cost and the delay could be avoided if the DAT could be used in lieu of PACE. This possibility lead to the study reported herein which tests the hypothesis that:

FOR APPLICANTS TO THE LICENSED PRACTICAL NURSING PROGRAM AT NORTH SEATTLE COMMUNITY COLLEGE, THE DAT PREDICTS SUCCESS IN THE CLASSES AND ON THE STATE LICENSURE EXAMINATION AS WELL AS OR BETTER THAN THE PACE.

The Differential Aptitude Test has been is use since 1947 for measuring abilities of students, primarily in the eighth through twelfth grades. A review of the Fourth Edition for the DAT Forms L & M shows that the DAT correlates greater than .5 with many intelligence and/or scholastic aptitude tests, such as the California Test of Mental Maturity; Lorge-Thorndike Intelligence Tests; and the various Iowa tests. There is a plethora of information in the literature on the DAT; whereas, there is a dearth of information on the reliability and validity of the PACE. Evidence indicates (1) that the DAT's are reliable instruments within single grades and for each sex. The degree of consistency of the students' performances is satisfactory on correlations between ninth

grade scores and twelfth grade scores on the DAT's. (They range from .58 to .87.)

THE POPULATION

There is a total population of 262 prospective students who took the PACE between October 1973 and November 1974. Of this population, 136 also took the DAT (TABLE I). From this population, 72 have been admitted into the LPN program at NSCC. There are three (3) males currently enrolled in the NSCC-LPN program. Because of this minimal number of males, sex is not considered as a contributing independent variable. There are no students in the LPN program who have DAT scores only. Of these 72 students admitted into the LPN program with PACE scores greater than the 40th percentile, 28 have graduated and successfully passed the Washington State Board Examination for LPN's, while five (5) students did not pass this state exam. (Forty-four students are continuing their studies.)

TABLE I

Number of students taking the PACE and/or DAT and date of PACE

No.	PACE ONLY	PACE & DAT	DATE OF PACE
39	19	20	October 3, 1973
21	20	1	October 25, 1973
32	11	21	November 19, 1973
13	13	0	December 19, 1973
20	6	14	February 19, 1974
26	8	18	April, 1974
25	6	19	March 19, 1974
17	8	9	May 14, 1974
17	4	13	June 19, 1974
26	11	15	October 2, 1974
26	21	5	November 5, 1974
Totals- 262	127	135	

The tests consist of the following sections:

TABLE I (Continued)

DAT	PACE
1. verbal reasoning + numerical ability	a. science and health
2. verbal reasoning	b. general information
3. numerical ability	c. arithmetic
4. abstract reasoning	d. total
5. grammar	e. vocabulary
6. spelling	f. reading
	g. total
	h. composite

There were few controls applied to the multiple taking of the same DAT. Several persons took all or part of the DAT twice. The more recent dated scores will be used. In most cases no provision had been made for retaking a different version of the DAT. Forms L & M tests were used in all cases of the DAT. There have been no repeated PACE scores, and it is still unclear if the National League of Nursing has alternate forms of PACE for this eventuality.

ANALYSIS OF THE TESTS

The PACE has five (5) sub-test scores and three (3) composite scores which combine sections. All of the sections and combined scores are highly intercorrelated. TABLE II presents the intercorrelations for PACE based on the 262 North Seattle Community College LPN students and applicants. All of the intercorrelations are significantly different from zero order at the .01 level of significance.

The DAT has five (5) sections and one (1) score that combines the verbal and numerical sections. All of the sections and the combined score are highly intercorrelated with one exception. Abstract reasoning does not correlate with spelling. Fourteen of the fifteen intercorrelations are significantly different from zero order at the .01 level of significance (see TABLE II).

TABLE III presents the correlations between the sections and combined scores of PACE and DAT. Of the Forty-eight (48) correlations presented, forty-one (41) are significant at the .01 level, three (3) at the .05 level and the remaining four (4) are not significant. These analyses suggest that the two tests do not have discrete sections which measure different kinds of knowledge or achievement, and that the two tests may be interchangeable.

In addition to testing the hypothesis, another set of correlations is presented. The sections and combined sections of both tests are correlated with grades in three LPN classes at North Seattle Community College, prior level of academic achievement (highest grade attained), high school grade point average, age, and the score on the Washington LPN licensure examination. These correlations are presented in TABLE IV.

All of the PACE scores correlate significantly with grades, G.P.A., etc., except the arithmetic section which does not correlate significantly with grades received in the LPN courses. Fifty-three (53) of the fifty-six (56) correlations computed between PACE scores and the other variables mentioned are significant at the .05 level or above.

For the DAT, only seventeen (17) of the forty-two (42) correlations are sufficiently high to be significant at the .05 level. The other 25 are not. The verbal score correlated with six (6) of the seven (7) variables, with high school grade point average being the exception.

Given the high inter- and intra-test correlations, it was rather surprising to find the difference in correlations with the seven (7) non-test variables; however, the N varies considerably with DAT having the lower N in all cases when compared with PACE.

TABLE II

PACE

Inter-Scale Correlations

1. Science & Health	X							
2. General Infor	.78	X						
3. Arithmetic	.61	.63	X					
4. Total First 3	.91	.92	.81	X				
5. Vocabulary	.72	.83	.63	.83	X			
6. Reading	.68	.75	.63	.78	.83	X		
7. Total Voc. & Read.	.73	.83	.66	.84	.96	.95	X	
8. Composites	.88	.90	.80	.97	.91	.88	.94	X
	1	2	3	4	5	6	7	8

N = 262

All have P .01

DAT

Inter-Scale Correlations

VR + NA	X					
Verbal	.84** N = 118	X				
Numerical	.76** N = 118	.35** N = 118	X			
Abstract	.54** N = 116	.47** N = 116	.43** N = 116	X		
Grammar	.63** N = 115	.73** N = 115	.35** N = 115	.26** N = 114	X	
Spelling	.36** N = 117	.37** N = 117	.24** N = 117	.01 N = 116	.50** N = 115	X
	VR + NA	V	N	A	G	S

** = .01

TABLE III

P A C E - D A T CORRELATION

N = 118

	VR + NA	Verbal	Numerical	Abstract	Grammar	Spelling
Science & Health	.30**	.46**	.04	.07	.44**	.50**
General Information	.58**	.75**	.16*	.27**	.63**	.39**
Arithmetic	.61**	.59**	.37**	.33**	.57**	.34**
Total First 3	.55**	.69**	.20*	.24**	.62**	.50**
Vocabulary	.54**	.72**	.12	.20*	.73**	.35**
Reading	.62**	.72**	.25**	.36**	.64**	.32**
Total Voc. & Reading	.61**	.76**	.19*	.39**	.73**	.36**
Composite PACE	.61**	.75**	.22**	.28**	.70**	.50**

** .21 & Above $P < .01$

* .15 to .20 $.01 < P < .05$

TABLE IV

D A T & P A C E SCORES

CORRELATED WITH ACHIEVEMENT & AGE

		NVR 024	NVR 025	NVR 026	Prior	H.S. GPA	State Board	Age
DAT	VR + NA	.36* N = 24	.53** N = 25	.41* N = 25	.33** N = 105	.10 N = 62	.63** N = 14	.00 N = 111
	Verbal	.46** N = 24	.62** N = 25	.60** N = 25	.27** N = 106	.13 N = 63	.74** N = 14	.16* N = 112
	Numerical	-.04 N = 24	.11 N = 25	-.09 N = 25	.32** N = 105	.04 N = 62	-.11 N = 14	-.14 N = 111
	Abstract	.33 N = 23	.13 N = 24	.11 N = 24	.09 N = 104	-.03 N = 62	.53* N = 14	-.38** N = 110
	Grammar	.17 N = 22	.20 N = 23	.27 N = 23	.30** N = 103	.10 N = 62	.21 N = 14	.33** N = 109
	Spelling	.00 N = 24	-.04 N = 25	.01 N = 25	.25** N = 105	.14 N = 62	.09 N = 14	.16* N = 111
PACE	Science & Health	.31* N = 55	.35** N = 58	.29* N = 58	.25** N = 211	.23** N = 113	.41* N = 30	.32** N = 217
	General Information	.50** N = 55	.48** N = 58	.45** N = 58	.26** N = 211	.23** N = 113	.75** N = 30	.38** N = 217
	Arithmetic	.15 N = 55	.11 N = 58	.08 N = 58	.21** N = 211	.22** N = 113	.34* N = 30	.18** N = 217
	Total First 3	.42** N = 55	.43** N = 58	.37** N = 58	.28** N = 211	.26** N = 113	.67** N = 30	.35** N = 217
	Vocabulary	.55** N = 55	.43** N = 58	.50** N = 58	.29** N = 211	.25** N = 113	.55** N = 30	.37** N = 217
	Reading	.55** N = 55	.55** N = 58	.47** N = 58	.33** N = 211	.12** N = 113	.49** N = 30	.14* N = 217
	Total Voc. & Reading	.59** N = 55	.51** N = 58	.52** N = 58	.32** N = 211	.20* N = 113	.58** N = 30	.28** N = 217
	Composite	.52** N = 55	.49** N = 58	.45** N = 58	.32** N = 211	.24** N = 113	.71** N = 30	.31** N = 217

** P < .01
* P < .05

TESTING THE HYPOTHESIS

To test the hypothesis, step-wise multiple regression was computed for DAT scores and for PACE scores against scores on the licensure examination. For the hypothesis to be accepted, it was necessary that the DAT scores account for as much or more of the variance than the PACE scores.

The results of these analyses are attached.

Three (3) multiple regression tables are presented:

(1) PACE with an "N" of 30 accounts for 62% of the variance on state licensure tests,
(2) PACE with an "N" of 14 accounts for 90% of the variance, and
(3) DAT with an "N" of 14 accounts for 68% of the variance.

The 30 graduates that took the State examination all had PACE scores, but only 14 had DAT scores; hence, the three tables. In all cases, the PACE and DAT scores are truncated in that only students with superior scores were admitted to the program. These data are not representative of community college LPN programs and may not be representative of LPN students at North Seattle Community College. The data is definitely not representative of applicants to the LPN program.

If a conclusion were to be drawn from the data presented, relative to the hypothesis it would have to be based on the two tables with "N's" of 14. These data are from the same students; PACE accounts for 90% of the variance, and DAT accounts for 68% of the variance. Therefore, the hypothesis would have to be rejected.

The decrease in accounted-for variance in the table with 30 students (down from 90% to 62%) seems to indicate that there is a need to postpone the conclusion and collect additional data. The ideal data would be test scores on the DAT and PACE in a situation where all applicants are admitted to an LPN program without regard to the scores. Since this is unlikely, the authors recommend that

concerned community colleges give both tests to applicants, admit students in the top 60% on one or both tests and then analyze the licensure test scores through time until one of the tests emerge superior.

P A C E MULTIPLE REGRESSION AGAINST STATE

LICENSURE SCORES

Dependent variable.. VAR015 - State Scores

Mean Response 534.86667 N = 30

Variable(s) entered on step number 1..

VAR007	Science
VAR013	Voc. & Read.
VAR009	Arithmetic
VAR008	General
VAR012	Reading
VAR011	Vocabulary
VAR014	Composite

		ANOVA	DF	SUM OF SQUARES	MEAN SQUARE	F	SIGNIFICANCE
Multiple R	.79037						
R Square	.62469	Regression	7.	138152.72459	19736.10351	5.23108	.001
Std. Deviation	61.42355	Residual	22.	83002.74208	3772.85191		

Coefficient of variability 11.484 percent

SUMMARY TABLE

Step	Variable Entered	F to Enter or Remove	Significance	Multiple R	R Square	R Square Change	Simple R	Overall F	Significance
1	VAR007	.34684	.562	.40769	.16621	.16621	.40769	5.23108	.001
	VAR013	2.08002	.163	.70244	.49342	.32721	.57529		
	VAR009	.07827	.782	.70978	.50379	.01037	.34316		
	VAR008	1.81928	.191	.76805	.58990	.08611	.74590		
	VAR012	1.61372	.217	.76805	.58990	.00000	.48526		
	VAR011	1.985.5	.173	.78907	.62264	.03274	.54887		
	VAR014	.12019	.732	.79037	.62469	.00205	.70667		

D A T MULTIPLE REGRESSION AGAINST STATE

LICENSURE SCORES

Dependent variable.. VAR015 N = 14

Mean Response 556.21429

Variable(s) entered on step number 1..

VAR001	Verbal & Numerical
VAR006	Spelling
VAR005	Grammar
VAR004	Abstract
VAR003	Numerical

		ANOVA	DF	SUM OF SQUARES	MEAN SQUARE	F	SIGNIFICANCE
Multiple R	.82925						
R Square	.68766	Regression	5.	66774.51542	13354.90308	3.52258	.056
Std. Deviation	61.57297	Residual	8.	30329.84172	3791.23021		

Coefficient of variability 11.070 percent

14

SUMMARY TABLE

Step	Variable Entered	F to Enter or Remove	Significance	Multiple R	R Square	R Square Change	Simple R	Overall F	Significance
1	VAR001	7.72552	.024	.62736	.39359	.39359	.62736	3.52258	.05
	VAR006	1.88021	.208	.66841	.44677	.05319	.09116		
	VAR005	1.04117	.337	.67968	.46196	.01519	.16330		
	VAR004	1.58157	.244	.78122	.61030	.14834	.53329		
	VAR003	1.98138	.19[illegible]	.82925	.68766	.07736	-.11289		

P A C E MULTIPLE REGRESSION AGAINST STATE

LICENSURE SCORES

Dependent variable.. VAR015 - Licensurees

Mean Response 556.21429 N = 14

Variable(s) entered on step number 1..

VAR007	Science
VAR008	General
VAR009	Arithmetic
VAR012	Reading
VAR011	Vocabulary
VAR014	Composite
VAR013	Voc. & Read.

		ANOVA	DF	SUM OF SQUARES	MEAN SQUARE	F	SIGNIFICANCE
Multiple R	.95107						
R Square	.90453	Regression	7.	87833.73843	12547.67692	8.12093	.010
Std. Deviation	39.30780	Residual	6.	9270.61871	1545.10312		

Coefficient of variability 7.067 percent

S U M M A R Y T A B L E

Step	Variable Entered	F to Enter or Remove	Significance	Multiple R	R Square	R Square Change	Simple R	Overall F	Significance
1	VAR007	2.98399	.135	.35958	.12930	.12930	.35958	8.12093	.010
	VAR008	2.48771	.166	.77850	.60607	.47677	.70330		
	VAR009	.90469	.378	.79808	.63692	.03086	.34241		
	VAR012	8.78579	.025	.82979	.68855	.05162	.42580		
	VAR011	11.70912	.014	.83009	.68905	.00050	.42343		
	VAR014	1.06145	.343	.83019	.68921	.00016	.74172		
	VAR013	13.53213	.010	.95107	.90453	.21532	.48587		

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